


A proposal for the use of a targeted, parent-child, school- based educational intervention to reduce initial experimentation with methamphetamine by teenagers in Western North Carolina.

by

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**A proposal for the use of a targeted, parent-child, school- based educational intervention to reduce initial experimentation with methamphetamine by teenagers in Western North Carolina.**

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*Abstract*

Methamphetamine use is a growing threat to small rural communities in Western North Carolina. As clandestine labs with their toxic by products flourish, increasing numbers of teenagers are seen in the local emergency departments with symptoms of acute methamphetamine intoxication. Research points to the potential long-term damage likely to be suffered by individuals and the community from this methamphetamine epidemic. It is becoming clear that control efforts are costly and substance abuse treatment for a developed addiction is often ineffective and needs to be repeated. As with most public health threats, there is growing recognition that the problem is best addressed through early intervention. It is suggested that the development of an intensive effort targeting middle school children and their parents, strengthening parent-child bonds and communicating a strong non-use message may be an effective strategy in the prevention of initial experimentation with methamphetamine in adolescence.

**Methamphetamine is becoming the drug of choice among rural youth in small communities. The implementation of a targeted, parent-child, school- based educational intervention is a worthwhile strategy in the attempt to reduce initial experimentation with methamphetamine use by teenagers.**

### *Introduction*

Methamphetamine, a synthetic stimulant, is becoming widely used as a drug of addiction and dependence in the rural communities of Western North Carolina (Personal Communication SBI personnel May 2005). There is evidence that teenagers have embraced this as a drug of choice and increasing numbers of adolescents and young adults, in various states of acute methamphetamine intoxication, are being seen in the local emergency rooms(Personal Communication ED Physicians May 2005). The community response to this growing public health threat has been the formation of a community coalition to investigate effective methods of control and prevention.

First made in Germany in the late 1800's, amphetamine is a synthetic stimulant, initially developed for medical use as an anti-asthma drug and an over-the-counter decongestant. Methamphetamine, its more powerful water-soluble cousin, was first made some forty years later in Japan. The Japanese and US governments apparently provided it for soldiers in WW II to keep them awake under grueling conditions, and, in the Vietnam War, US soldiers self-medicated with more of the stimulant than that used by the entire rest of the world during WW II (History of Amphetamine 2005). Historically it was used for medical purposes for the treatment of narcolepsy, for appetite suppression, and mild depression. Methamphetamine is now known to be extremely addictive and is a Schedule II controlled substance, which means that the Drug Enforcement Administration monitors its use, making it available only in limited quantities and by written prescription. Current medical indications for its use are few but include the treatment of narcolepsy and Attention Deficit Disorder. Methamphetamine is a powerful stimulant and small doses can increase wakefulness, increase sexual performance, increase physical energy, increase activity, and decrease appetite. Methamphetamine can be manufactured in home labs from commonly available, innocuous over-the-counter medicines and household chemicals (Personal communication, North Carolina State Bureau of Investigation Officers May 2005). State Bureau of Investigation officers indicate that each methamphetamine cook will teach an average of eight to ten new cooks over the course of twelve months. Law enforcement personnel maintain that the recipes for its manufacture can easily be obtained from the Internet. A web search for recipes for the manufacture of methamphetamine fortunately led to sites for drug treatment and law enforcement sites warning about the negative effects of methamphetamine. Available however is the book 'Secrets of Methamphetamine Manufacture: Including Recipes for Ecstasy, MDA and other Psychedelics and Amphetamines' by Uncle Fester, available through the Internet book

company, Amazon.com. This makes it relatively easy for those interested in learning to cook methamphetamine to obtain the relevant information in relative privacy.

### *Neuroscience of Methamphetamine Use*

In the study of the brain and addiction, scientists have come to believe that addictive substances create dependence in the addict by changing the brain's reward functions, located in specific structures of the brain, that reinforce certain behaviors such as eating, sexual intercourse, exercise, and social interaction (Koob & Bloom, 1998). Addictive substances can, to different degrees, cause the nerve endings called synapses of this system to flood with excessive amounts of dopamine, creating a brief rush of euphoria more commonly called a *high*. Although the high may last only a few minutes, it also produces more longer-lasting effects in the brain. There is a system in the brain known as the reward system, mediated by specific nuclei in parts of the brain. Under normal conditions when an activity is pleasurable, these nuclei release the neurotransmitter dopamine, which leads to the activation of special substances designed to calm the initial reaction and also to encourage a continued desire to pursue the behavior responsible for those positive feelings of calm. Addictive substances create a much greater than normal dopamine release in these brain structures, and the subsequent reactions of continuing to pursue the behavior responsible for these feelings are greatly exaggerated as well. Brain structures such as the nuclei, the hippocampus, and frontal cortex associate the use of the drug responsible for these exaggerated responses with intense pleasure and feelings of well-being, an association that becomes much stronger with each successive exposure to the drug. Over time, pursuit of these feelings of calm or pleasure comes to dominate normal thoughts and desires. When cravings for the drug are no longer controllable and the cravings drive thought and behavior, the user is

considered addicted (Nestler & Malenka, 2004). Methamphetamine is known to release more than three times as much dopamine as cocaine ("Methamphetamine & Methamphetamine Addiction Information," n.d.). This intense sense of pleasure is followed by a rapid descent into depression and this pattern of excitation and depression is also thought to lead to increased use of the drug in an effort to maintain the pleasure and eventually and also contributes to the rapid descent into addiction.

Research points to the fact that methamphetamine has both immediate and long-range effects on the central nervous system of the user. Abusers who are in an acute methamphetamine intoxicated state present in Emergency Departments with symptoms of psychosis, agitation and neurological symptoms such as jitteriness, shakiness, and choreo athetoid movements (London et al 2004). More alarming are the possible long-term effects on the brain. One study (Chang & Ernst, 2000) shows that, like the changes undergone by the brain in Alzheimer's dementia, stroke and other brain diseases in which there is brain cell loss, the brain subjected to chronic methamphetamine use shows reduced concentrations of a necessary brain substance called N-acetyl-aspartate. Those using the most methamphetamine demonstrated the most cell loss, and, as the researcher pointed out, the cells being damaged are neurons or the cells we use for thinking and learning. Another alarming study done on experimental mice at the University of Chicago (Bubula, Lew Won & Heller, 2002) revealed that male mice that were prenatally exposed to methamphetamine and were later given the drug themselves as teens or adult mice show an increased toxicity, as evidenced by brain cell changes, that could hasten the onset of brain disorders such as Parkinson's disease.

### *Epidemiology of Methamphetamine Use*

Increased frequency of methamphetamine use is shown in data presented from a variety of sources. Medical examiners in participating metropolitan areas provide data on drug-related episodes as well as drug abuse deaths from emergency departments through the Drug Abuse Warning Network (DAWN). Data on client admissions to states' primarily publicly funded specialty substance abuse treatment centers are obtained from the Treatment Episode Data Set (TEDS), which annually collects aggregate data of demographic characteristics and substance abuse problems for patients admitted for treatment from a number of states. It is important to note however, that all states do not participate, and a few participating states do not identify methamphetamine abusers separately. An ongoing national probability survey, the National Household Survey on Drug Abuse (NHSDA), provides information on the use of illicit drugs, alcohol, and tobacco in the civilian noninstitutionalized population of the U.S., 12 years old and older. Many of these data sources are aligned with the U.S Department of Health and Human Services Substance Abuse and Mental Health Services Administration (SAMHSA)

The following is an analysis from the SAMHSA July 2003 report on Emergency Department trends from DAWN data. When a drug is reported as present in a patient during an emergency room visit, it is called a mention. This shows that the number of times methamphetamines is present during ED visits has decreased between 1954 and 1999, but has now increased by 73% in the three years since (SAMHSA, p. 34, 2004)



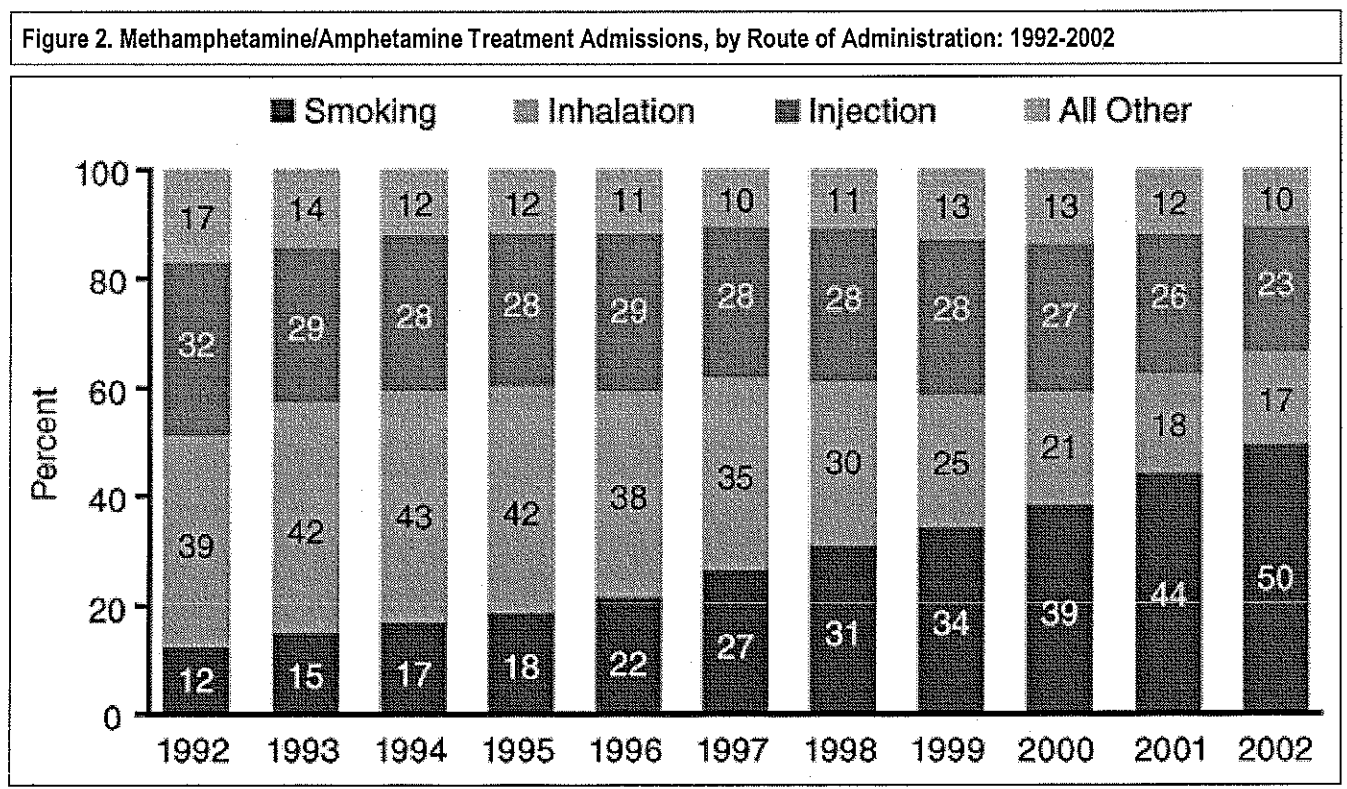
**Figure 1 Methamphetamine Mentions (Emergency Departments), 1994–2002**

Year	Methamphetamine ED mentions
1994	17,537
1995	15,933
1996	11,002
1997	17,154
1998	11,486
1999	10,447
2000	13,505
2001	14,923
2002	17,696

Source: Drug Abuse Warning Network (DAWN 2003)

Methamphetamine use, once traditionally associated with white, male, blue-collar workers, is now being associated with younger and adolescent groups (National Institute on Drug Abuse Community Alert Bulletin October 1998). According to the 2000 National Household Survey on Drug Abuse, an estimated 8.8 million people (4% of the population) have tried methamphetamine at some time in their lives and many of these people are reporting the regular and chronic use of methamphetamines. Amphetamines and/or methamphetamine were the primary substance of abuse in more than 125,000 substance abuse treatment admissions in 2002 accounting for almost 7% of all admissions) reported to TEDS. Methamphetamine can be smoked inhaled or injected, and, according to data from the DASIS (Figure 2), the rate of admissions for primary methamphetamine/amphetamine treatment admissions who smoked (instead of inhaled or injected) methamphetamines or amphetamines was 50% of total methamphetamine users in 2002 compared with 12% in 1992. The significance of this is that the use of faster routes of administration, such as smoking and injecting, reportedly give the user a greater high.

Abuse through these routes, however, further increases the speed and potential for addiction (DASIS report 2005). These data are now being collected locally but personal experience in treating addicted young adults at the local hospital suggests that smoking and injecting are also extremely popular routes of administration among local youth in the Western North Carolina area.



Source: 2002 SAMHSA Treatment Episode Data Set (TEDS).

The NHSDA survey also found that an estimated 6.9% of US high school students have used methamphetamine at least once, confirming the impression that methamphetamine use is occurring more commonly in younger age groups. Methamphetamine cases have been on the rise in some of the cities of North Carolina, such as Raleigh, Charlotte, Greensboro and Asheville, but rural communities in many counties of the western part of the state have also experienced a surge in methamphetamine manufacturing and use (Personal Communication from the NC State Bureau of Investigation). Clandestine labs producing one to two-ounce amounts continue to proliferate in the central and western part of the state. The western North Carolina area has recently experienced a loss of manufacturing jobs as many large plants have closed and there is concern that the rise in methamphetamine manufacture and distribution might have its roots in the area's changing economic climate. The manufacture and sale of methamphetamine may be replacing manufacturing jobs as a source of income and the use of methamphetamine might provide an escape for a person suffering the stress of job loss.

Methamphetamine can be made with relative ease, using commonly available over-the-counter medications and household chemicals. In addition, the chemicals used to make methamphetamine in home-based, makeshift labs are extremely volatile, exposing children in particular and others living in close proximity to these labs, not only to toxic fumes but also to the risk of fire and explosions. Both its addictive potential and ease of manufacture combine to make methamphetamine a drug with high potential for widespread abuse especially among those too poor to afford more expensive street drugs. Methamphetamine abuse has long been thought of as California's problem (Gibson Leamon & Flynn 2002). Recently, however, its use has spread east and recent data suggest that methamphetamine is rapidly becoming a larger problem in rural areas. It is thought that it became popular in rural areas because it was thought to be an answer for

increased energy in factory and other settings where people are being asked to work longer hours and double shifts (Johnston 2004). Because it can be manufactured locally, it is cheaper and more accessible than some other street drugs, and the isolation of rural locations may make it easier to hide the manufacture of the drug.

Statistics recently obtained (Personal communication from North Carolina State Bureau of Investigation, May 2005) indicate that, in the sixteen counties that comprise Western North Carolina, 72 methamphetamine labs were discovered in 2004. Authorities with the North Carolina State Bureau of Investigation report 124 children found in homes with methamphetamine precursors in 2004 and 70 so far in 2005. Thirty five percent of these children tested positive for methamphetamine from the exposure to the manufacturing process in their homes. It is estimated to cost \$3,000 to \$10,000 to clean and decontaminate each lab and the surrounding area, and that the state spent almost half a million dollars in cleanup in 2004. Each clandestine methamphetamine lab produces five pounds of waste for each pound of methamphetamine produced. These byproducts are usually highly poisonous if inhaled and usually highly flammable. Because of the presence of these dangerous chemicals, it takes as many as five agents to safely enter, secure and dismantle each clandestine laboratory and these agents must be screened yearly for signs of lasting damage related to exposure to the very toxic chemicals involved in the manufacturing process. The SBI reports that there were 24 reported officer injuries in 2003 but only 12 in 2004 as protocols for safer entry and seizure of these labs were introduced in the various counties of Western North Carolina.

According to latest NSDUH data, (Figure 2) some children, as early as twelve or thirteen years of age are already abusing drugs such as alcohol, marijuana and inhalants. Most young

people do not however progress to abuse of drugs but of those who do progress, methamphetamine, because of its easy availability, is a possible drug of choice. Since the pattern of adolescent drug use often follows the pattern of neighborhood availability, the increased availability of locally manufactured methamphetamine is likely to further encourage adolescent experimentation with the drug. Adolescent drug use is also dependent upon any perceived risks involved in using that particular drug. Because of the fact that it is prescribed legitimately in much lower doses for Attention Deficit Disorder, and because those who use it experience significant loss of appetite, methamphetamine is likely to be perceived as being less risky to use when compared to some of the other illicitly available drugs.

**Figure 3: Percentage of students reporting drug use by grade in North Carolina 2001**

Drug type and use	9 <sup>th</sup>	10 <sup>th</sup>	11 <sup>th</sup>	12 <sup>th</sup>
Lifetime marijuana use	33.2%	35.5%	48.6%	48.4%
Current marijuana use	20.1	18.5	22.4	22.5
Lifetime cocaine use	7.5	6.4	5.0	6.9
Current cocaine use	3.2	1.8	1.9	3.6
Lifetime inhalant use	15.2	14.3	13.8	10.0
Lifetime heroin use	2.4	2.3	1.1	2.8
Lifetime methamphetamine use	7.8	7.5	7.1	8.1
Lifetime illegal steroid use	6.6	4.4	3.5	4.1
Lifetime injecting illegal drug use	2.2	1.9	0.9	1.9
Tried marijuana before age	13.4	9.0	9.2	8.5

Office of National Drug Control Policy; Drug Policy Information Clearinghouse/ State of North Carolina-Profile of Drug Indicators Jan 2004

Figure 3 shows the lifetime use of methamphetamine in 10<sup>th</sup> graders in North Carolina to be 7.5% and in 12<sup>th</sup> graders 8.1% in 2001. Data from the *"Monitoring the Future: 2002 Data From In-School Surveys of 8th, 10th, and 12th Grade Students,"* December 2002, showed that in 2001, the lifetime use of methamphetamines for 8<sup>th</sup> graders was 4.4% nationally, for 10<sup>th</sup> graders it was 6.4 % and for

high school seniors 6.9%. It is evident that North Carolina high school youth, as early as 2001, showed a higher trend in methamphetamine use than the national average for same age children. National figures, obtained from the "Monitoring the Future" data for 2004 for 8<sup>th</sup> 10<sup>th</sup> and 12<sup>th</sup> graders (Figure 4) show a decline in all grades over the 2001 national average. Data for 2004 for North Carolina do not seem to be available as yet but it would be interesting to see if the trends match the perception that there is a rise in methamphetamine usage among high school aged children in this state.

**Figure 4. High School Students Reporting Methamphetamine Use, 2004**

Grade	Lifetime	Annual	Past 30 Days
8 <sup>th</sup>	2.5%	1.5%	0.6%
10 <sup>th</sup>	5.3	3.0	1.3
12 <sup>th</sup>	6.2	3.4	1.4

National Institute on Drug Abuse and University of Michigan, Monitoring the Future 2004 Data from In-School Surveys of 8th-, 10th-, and 12th-Grade Students, December 2004

#### *Consequences of Adolescent Substance Abuse*

The consequences of adolescent substance abuse in general, and methamphetamine use in particular, are considerable, and adolescents face unique risks associated with substance abuse. The adolescent's brain is still developing and use of substances may compromise an adolescent's mental and emotional development, and interfere with how young people approach and experience interactions, according to the SAMHSA (1999) study on the Treatment Improvement Protocol from the Center for Substance Abuse Treatment. In addition, adolescents

are at serious risk for a number of direct and indirect consequences, which include traffic accidents, school-related problems, risky sexual behavior and practices, and delinquency.

According to data from SAMHSA 1999, Treatment Improvement Protocol (No 32) forty-five percent of all deaths from traffic accidents are related to the consumption of a substance, usually alcohol, and an estimated 18 percent of drivers age 16 to 20 (or 2.5 million adolescents) drive under the influence of substances. While the problem is largely with alcohol, substances such as methamphetamines are mind altering and change perception and judgment, causing or contributing to traffic accidents.

Although amphetamines are used by prescription for the treatment of Attention Deficit Hyperactivity Disorder in children and adolescents, and can enhance focus and improve grades, when abused and used in large amounts, amphetamines can be associated with declining academic performance. Cognitive and behavioral problems experienced by teens abusing substances may interfere with their academic performance, and adolescent substance abuse, in general, is associated with declining grades, absenteeism from school, and dropping out of school. (Crowe 1998).

Adolescents who use drugs and alcohol are more likely than non-using teens to have sex, initiate sex at a younger age, and have multiple sex partners, placing them at greater risk for unplanned pregnancies and HIV/ AIDS, hepatitis C, and other sexually transmitted diseases according to a study done at Columbia University by the National Center on Addictions("Dangerous

Liaisons: Substance Abuse and Sex," 1999). Methamphetamine, because it is associated with enhanced sexual performance, is more closely associated with risky sexual behavior in its users.

According to another study (Greenblatt, n.d.), adolescents who use substances weekly are six times more likely than nonusers to report they run away from home, five times more likely to say they steal from places other than home, and four times more likely to report they physically attack people. Adolescents age 12 to 16 who have ever used substances such as marijuana are more likely at some point to have sold a substance (24 percent vs. less than 1 percent), carried a handgun (21 percent vs. 7 percent), or been in a gang (14 percent vs. 2 percent) than their non-abusing peers (Synder & Sickmund 1999).

Substance abuse can compromise an adolescent's psychological and social development in areas such as the formation of a strong self-identity, emotional and intellectual growth, establishment of a career, and the development of rewarding personal relationships, according to the 1999 SAMHSA study. This impaired development often leads to fragile, dependent adults who can make little contribution to society. The earlier the age at which a person is first introduced to substance use, the more likely that person is to develop a substance abuse disorder. Statistics available for alcohol use suggest that a person who starts drinking alcohol at age 13 is four times more likely to develop alcohol dependence at some time in his or her life than someone who starts drinking at age 20 (Grant & Dawson 1997). Methamphetamine abuse is likely to produce similar results.



Methamphetamine abuse and addiction can also lead to loss of functioning in adulthood and the community burden of addiction to methamphetamine is far-reaching. Adults, like adolescents experience the enhancement in sexual performance resulting from methamphetamine use and adult users of methamphetamine also tend to be more sexually promiscuous and irresponsible and less likely to use safe sex practices. This leads to increased risk of sexually transmitted diseases such as HIV and Hepatitis C (National Center on Addiction and Substance Abuse at Columbia University. *Dangerous Liaisons: Substance Abuse and Sex*, 1999). The children of parents who make or use methamphetamines are at increased risk of neglect and delinquency, both from the example set by parents as well as from the loss of family accountability and connectedness that accompanies drug use. According to the Centers for Disease Control report of April 2005, communities with methamphetamine labs are increasingly exposed to the noxious fumes associated with its manufacture and to the toxic byproducts that are invariably poorly and irresponsibly disposed of.

### *Substance Abuse Theories*

Adolescent substance abusers are different from adult substance abusers in a number of important ways, including drug use patterns and developmental and social factors (Winters, Stinchfield, Opland, Weller, & Latimer, 2000). Adolescents seem to be more susceptible than adults to the development of substance dependence syndromes, and can become dependent even upon substances not known to provoke physiological dependence and withdrawal in adults. The progression from social use to dependence and addiction can also be more rapid in adolescents

than in adults (Winters, 1999). Adolescents presenting for treatment typically demonstrate a higher degree of co-occurring psychopathology, which frequently precedes the onset of problem substance use and often does not remit with abstinence (Riggs, Baker, Mikulich, Young, & Crowley, 1995; Rohde, Lewinsohn, & Seeley, 1996; Kandel et al., 1997).

Because of these apparent differences in adolescent substance abuse and addiction compared with the addictive process in adults, it is useful to review some of the theories of the development of substance abuse and addiction so that knowledge of the process in adolescents might lead to a more targeted prevention strategy. These are the Problem Behavior, the Social Learning, the Cognitive and Social Inoculation Theories as well as Stage Theory and the Biopsychosocial Theory, all of which are discussed below.

#### *Problem Behavior Theory*

Problem Behavior Theory, first developed by Jessor and Stressor (1977), links drug use in adolescence to early dysfunctional behavior. Teenagers alienated from family values and societal and community norms, resistant to authority and having low religious values and attachments, have a greater tolerance for deviant behavior, show less concern for their personal safety, tend to thrill-seeking, are low academic achievers and tend to be attracted to the drug culture. (Hawkins, Catalano & Miller 1992). This theory stresses the adolescents' perception of parental and peer attitudes and behavior as determinants of their own behavior.

### *Social Learning Theory*

Social Learning Theory (Bandura 1977), in contrast to the Problem Behavior Theory focuses on the actual peer and parent behavior rather than perceived behavior as the important determinant, making the case that the adolescent learns behavior modeled by those around them. Substance abuse is seen as a socially learned behavior. Bandura's studies normally consist of closely observing children who are shown a model behaving in a particular manner. The extent to which they imitate the model is then measured. The results appear to show that children are more likely to imitate models that are similar to themselves, who are seen to be rewarded for their actions and who have some kind of prestige (because of their possessions, their strength etc.)

### *Cognitive and Social Inoculation Theory*

Cognitive and Social Inoculation Theory (McGuire, 1968; Evans et al., 1981) takes the position that children are exposed to conflicting ideas about substance use at an early age and that this exposure is much like the exposure to germs. When applied to prevention, this theory offers the hope that, despite negative peer influences and dysfunctional families, the adolescent can be *inoculated* against these influences. Much like inoculation against infectious diseases, this theory of exposures to positive or negative influences, supports the use of interventions that build up a psychological immunity to drug using behavior. It offers initial exposure to the prevention message and booster doses at intervals thereafter to boost the immunity to negative peer influences.

### *Stage Theory*

Stage Theory (Kandel 1980) proposes that the intervention be shaped to focus on the developmental stage and issues being faced by the adolescent at the time. This theory addresses the gender differences in reaching the various developmental stages, directing the prevention strategy to address this gender difference and to make use of the various developmental tasks relevant to each stage.

### *Biopsychosocial Theory*

Biopsychosocial Theory focuses on the complex interaction between the internal world of adolescents and the external environment in which they operate (Hawkins & Weiss, 1985). It bases its understanding of the theory of addiction on the fact that adolescents need to feel a sense of connectedness with their families and ultimately with their communities before they are likely to want to buy into family and society rules. The theory is that adolescents who might not be allowed to be part of the family and school decision making process fail to develop a sense of ownership for the decisions and do not build positive bonds with the institution or community. This lack of family and community connectedness is thought to lead to delinquency and drug abuse. These are the adolescents whose sense of misplaced needs for connectedness often leads them to develop associations with gangs or groups of negative peers who provide them with the sense of approval and belonging that they seek and that is absent in their family settings.

### *Prevention Models*

The increased abuse of methamphetamines among adolescents highlights the need to identify effective prevention strategies capable of reducing initial experimentation with this very

addictive illicit drug. An understanding of the theories of the development of substance use and abuse leads to the development of some models of prevention, which can be based on these theories. Since prevention strategies that are research-based often follow prevention models, it is appropriate to review some of the known models of prevention. Some models have had greater demonstrated success than others and a proposal for this community will use a combination of the most successful of models.

### *The Information Prevention Model*

Prevention models based on providing information to teenagers about the particular dangers of specific behaviors, attempt to increase their knowledge, particularly of the negative effects of their behavior. Teenagers are expected to act on this increased knowledge by modifying attitudes and behavior. This type of program has been demonstrated to have had only limited success, as young people tend to disbelieve the negative claims made and dismiss them as exaggerated. The information only prevention programs have sometimes peaked curiosity in adolescents and served to exacerbate rather than extinguish the target behavior.

### *The Alternatives Prevention Model*

The Alternatives Model involves adolescents in healthy activities as a substitute for negative behaviors. The assumption is that if teenagers are busy and actively involved in healthful pursuits, the boredom that sometimes leads to experimentation will be relieved and the enhanced self-efficacy gained from mastery of these healthy pursuits will move them to make positive choices.

There is some evidence that some of the more social alternative activities might be associated with increased drug use because peers using substances might be present at these social activities and might model the very behavior the activity is attempting to extinguish (Swisher and Hu, 1993). Some success has been shown where teens are involved in hobbies or social activities of a religious nature but generally professionals in the area of prevention have abandoned this method as ineffective.

#### *The Affective Education/Social Competency Prevention Model*

The Affective Education/Social Competency model makes some assumptions about the genesis of substance abusing behaviour. It assumes the users to have low self-esteem and deficient communication, social and coping skills. The interventions include stress management, assertiveness, problem solving and communications skill building but often do not include any specific drug related messages. Programs based on this model have also been of relatively little demonstrated success in preventing teenage substance abuse.

#### *The Social Environmental Prevention Model*

The Social Environmental model has been the most useful and had initially demonstrated success mainly in the areas of tobacco use and alcohol abuse. Prevention strategies based on this model include both information as well as skill building activities. It also has some features based on social learning theory, which asserts that learning can occur within a social context (Bandura 1977). These include the training of adolescents to resist peer pressure and the reinforcement of non-use as the norm and offers the best framework upon which to develop a prevention strategy.

### *Proposed Intervention*

In designing a program of intervention, several already established drug prevention programs were reviewed. The Life Skills Training Program is designed to address both risk and protective factors. It uses the concept of teaching sessions followed by regular booster sessions and is a long-ranged, educational program taught over three years. It uses information in the development of drug resistance skills in middle school aged children. It teaches them self-management skills as well as general social skills. Testing of this program has shown efficacy against tobacco, alcohol and drug use (Tobler, 1986). When the booster sessions were employed, the benefits were found still to be in place beyond high school years.

Project ALERT or Adolescent Learning Experiences in Resistance Training is a similar prevention program, developed for use of two years. Its fourteen lessons help students establish non-use as a norm and resist pro use peer pressures. It has been shown to prevent first use of and transition into regular use in adolescents across various communities and is likely to be effective in a rural setting (Gosh-Dastidar, Longshore, Ellickson & McCaffrey, 2004).

The proposed intervention has a very strong parent component modeled after two successful programs. The Guiding Good Choices Program (Hawkins et al, 1999; U. S Department of Education 2001) and the Life Skills Training Program (Botvin et al 1995, 1997, 2003; U. S. Department of Education 2001) have both been modified and the essential elements combined to target parents and to teach them how to create the type of family connectedness, which reduces risk factors associated with deficiencies in the family background and personal relationships.

The proposal for a Western North Carolina prevention program is that these three programs be combined and modified for the setting and age group to provide a strong parent-child prevention program. The proposed program will use available federal and state anti-drug funds for an intervention that targets all middle school children in the 6<sup>th</sup> 7<sup>th</sup> and 8<sup>th</sup> grades and the parents of these children and without singling out at-risk children specifically. It will use the PTA in the middle school to access the parents. Local businesses will be encouraged to donate prizes such as gift certificates, which will be used as incentives to encourage parents to attend these sessions. Teaching materials will be culturally appropriate and bilingual to address the needs of the growing Latino population in the area. There will be a total of ten sessions, done monthly through the school year, with four yearly booster sessions over the following two years, for a total of eighteen sessions for the child's middle school career. The use of an extended number of sessions is aimed not only at reinforcing the message in children and parents but, it is hoped that the frequent meetings will begin to foster a deeper sense of cohesion and community among those participating. Parents will have the same schedule of sessions with different content, and those involved in the first ten sessions will be asked to commit to becoming peer leaders for the next cohort, in addition to receiving their eight booster sessions. The parents will be taught about



childhood development and about creating family closeness. Sessions will encourage parents to increase interaction and involvement with their children and empower them in the setting of clear limits and monitoring of children. Sessions should increase parental comfort in setting a clear message of non-drug use as the expectation and should also improve competence in teaching children age-appropriate, problem-solving strategies, developing conflict resolution skills within the family context and expressing positive feelings within the family.

Children's sessions will teach self-awareness and self-management skills. Through the use of didactic sessions, games, role playing and skits, children will be taught anger and frustration management, self-soothing skills and general social interaction skills. They will be taught reasons why people use and do not use drugs, and the consequences of drug use. They will also learn to identify and counter the pro drug pressures they might encounter and will be taught to resist both internal pressures as well as external or peer pressures to begin using drugs. Booster sessions shown to be effective in the Life Skills Training Program will be employed to identify the benefits of resisting pro-use pressure thus reinforcing the original teaching, and enhancing the resistance power of the initial message.

A questionnaire will be designed to evaluate parental knowledge of child development and parental self-view of parenting skills with regards to limit setting, conflict resolution and cohesiveness building. A similar questionnaire will be designed for the children, asking age appropriate questions about knowledge of drugs and their effects, self-awareness and self-efficacy and response to peer influence. These questionnaires will be administered at the beginning of the program and at three-month intervals to track understanding and adherence. Focus groups will

also be used to provide process evaluation of the program, and modifications to the program will be made based on feedback received. Longer-ranged, impact evaluation can be provided by conducting assessments of trends in use of, and attitudes towards, methamphetamine in these children who were exposed to the intervention as they progress through high school.

Local businesses are already cooperating with law enforcement to keep track of large or unusual purchases of precursor materials and local pharmacies have moved to limit access to precursor medications in the stores. Social Workers at the Department of Social Services are also being educated to recognize signs of clandestine labs in homes they visit and local educators are already being taught to recognize children who might be at risk in classrooms. These coordinated efforts, together with building resilience against use of methamphetamines by youth, will hopefully reverse the alarming trend of methamphetamine use in this rural community.

### *Discussion*

The Rand Drug Policy Research Center (1990) released an assessment of drug policies and strategies used in the U.S. Although it is some fifteen years old, some of the issues raised still seem to remain problems in measuring current success in dealing with drug use. The analysis suggested that government policies have not appeared to have had much success in reducing drug use, and noted that one factor to be considered is that the balance of prevention, treatment and enforcement has not been optimal. The authors conclude that enforcement has its limitations because of the well-organized drug distribution forces. Treatment is also seen as problematic because its effects on the community accumulate slowly, it is not always effective and is costly. (Caulkins, Reuter, Iguchi, & Chiesa, 2005) As with treatment, the benefits of prevention can

appear to accumulate slowly, but even model prevention programs have been found to be cost-effective in no small part because they are relatively cheap. School-based prevention programs have, however, been shown to have beneficial effects on use of multiple substances (alcohol and tobacco, as well as illicit drugs) and on other deviant behaviors. The drug problem has also been characterized as much like an epidemic where early users entice other users giving an initial upsurge in use until the harmful effects become known and discussed (Caulkins, Reuter, Iguchi, & Chiesa, 2005). Use declines in the face of interventions and education, leaving a remnant group of chronically addicted users whose needs continue to drive the production of the drug. The conclusions and recommendations of the study are that drug use is a long-term problem and must be approached with methods aimed primarily at limiting the number of people who initiate use. The review concludes that there are times in the life cycle of use when enforcement might be effective and times when treatment is most important but that prevention must always be in progress to target and prevent the next wave of potential new users. This is entirely in keeping with the public health position that, in addressing most public health threats, prevention is almost always less costly than treatment and it is the premise of this intervention proposal and the rationale for this prevention strategy.

The most crucial risk factors in adolescent substance abuse are thought by some to occur from conception in a complex series of maturational, psychosocial and neuroadaptive events (Dawes & al) and affect early childhood development. While it seems clearer that children's innate temperament can place them at significant risk for later drug abuse (Prior, Sanson, Smart & Oberklaid, 2000), those who lack appropriate nurturing and attachment and who receive ineffective parenting, those who are from chaotic home environments in which there is substance abuse or

mental illness and those who develop without a significant relationship with a caring adult are at greatest risk of later drug abuse (Blum & Rinehart, 1997). Withdrawn and aggressive boys, in particular, often exhibit later problems and, if these behaviors continue, have a high likelihood of leading to other risks such as drug use and delinquency. Studies have shown that if children are doing poorly academically and socially at ages seven to nine, they are more likely to be involved with substance abuse by their early teens (National Institute on Drug Abuse Research Report Series - Methamphetamine Abuse and Addiction, 2003.).

Research supports the proposal that a comprehensive, school-based prevention program is a powerful tool in addressing adolescent health issues (Blum, McNeely, Rinehart, 2002). A school-based prevention program should ideally engage children from kindergarten through high school, blanketing them with the message in a way similar to successful language immersion. Project ALERT was tested in 30 schools in California and Oregon as early as the 1980's and demonstrated an effect on curbing the use of the marijuana alcohol and cigarettes in middle school children (Ellickson & Bell, 1990).

According to developmental psychologists, children in the middle school years are mastering the cognitive tasks of the concrete operational stage where thinking is becoming logical, where actions and consequences are better understood, but understanding still depends upon concrete references (Piaget & Inhelder, 1969). Studies reveal that resilience in adolescents is built from five factors initiated in the preadolescent stage (Werner & Smith 1992). These include the presence of mentors or informal networks of relatives, neighbors and teachers who have a memorable and positive influence on teenagers. A second surprising factor in reading ability.

Werner & Smith propose the theory that reading helps in the formulation of an adolescent's identity. A third and important factor is the ability to problem-solve. This is often developed in the academic arena but the skills learned are important when applied to the solutions to personal problems teens may encounter. Social skills or the ability to make and keep friends is another important resilience factor, as is the development of hobbies and interests.

One important risk factors outside the child's personality traits and family setting seems to be that of associating with peers with problem behaviors. This has been shown to be a powerful risk factor especially in adolescence, since it often exposes the teenager to the drug use or problem behavior in peers. Intervening at this level can be difficult since recent studies (Dishion, Kavanagy, Schneiger, Nelson & Kaufman.2002) show that the very intervention, if it involves a peer group, can present the opportunity for exposure to the risky behavior in peers.

Additionally, the National Institute of Drug Abuse (2003) has identified several overriding principles of successful prevention. It has identified successful strategies as those which take into account both risk factors, and protective or resilience factor, and seek to enhance the protective factors, while reducing the risk factors all within the context of an understanding of adolescent psychosocial development. Prevention programs should assess the risks and resilience factors in the community, strongly targeting factors that are identified as modifiable risks and identifying and strengthening protective factors. Prevention programs should address all forms of drug abuse, alone or in combination, and effective prevention programs should also be tailored to address the age, gender, and ethnicity of the target population. The proposal is one which takes all of these factors into consideration and is thought to be most appropriate for those children who are in the middle school or junior high school years when the intervention will begin to build a solid foundation

of resilience necessary for drug and particularly methamphetamine resistant teenagers in high school. This intervention aims to circumvent the potential complication of strong negative peer influence likely to be encountered if the intervention targets later adolescents, by intervening at a level prior to adolescence before the children reach the developmental stage where the influence of the peer group becomes of primary importance (Developing Adolescents, 2002). The focus on middle school children is an effort, therefore, to reach them prior to initiation of use, with the strong intervention message and to teach skills leading to increased self efficacy at a time before the change from middle to high school with the push towards independence, the increased academic workload and the social pressure presents increased risk for the onset of drug abuse.

This intervention seeks to take into consideration what is known of childhood development and the mechanism by which people become drug dependent or addicted. It also seeks to incorporate what is known of building resilience and minimizing risks in children. Consideration is given to what has been shown by research to have been successful in other areas of the country in similar populations. This program is one that can and should be used to address all drug use. It will be designed to be age gender and culturally competent.

Protective factors include strong family bonds, clear and predictable limits, parental involvement in all aspects of a child's life and stable home environment. Because of this, the proposed intervention is not only child-focused, but has a strong parent involvement. A knowledge of developmental tasks and stages is also important in a prevention strategy since risk periods appear to occur at times of transition (Perry, 2000). With its focus on the parents, this intervention hopes to sensitize parents to an understanding of child development, and to develop competence in recognizing the physical and emotional changes that accompany the onset of

puberty and place children at increased risk of beginning drug abuse. The intermediate goal of the intervention is to have parents recognize the need for age-appropriate parental monitoring of social situations and behaviors, to have them also recognize the need for them and their children to develop strong bonds with community, social and religious institutions, and through this, to provide protection for adolescents outside of the family setting.

A significant risk factor is the inability of a child to develop a significant relationship with a caring adult and ineffective parenting such as poor limit setting. This program engages parents in didactic training with an aim to having parents develop knowledge about children, and also develop the competence needed to help children navigate developmental milestones. An Iowa University study (Spath, 2002), demonstrated in a rural setting, the efficacy of such a program in inhibiting the initiation of marijuana and alcohol use in children. Because it is research-based, it is also reasonable to use such a program as part of a prevention strategy that has some hope of targeting methamphetamine use in a rural Western North Carolina setting.

According to some studies (NIDA Community Alert Bulletin on Methamphetamine, 1998), family-focused prevention efforts have been found to have a greater impact than strategies that focus on parents only, children only or adolescents only. By combining elements from these programs, an intervention is likely to have the recommended combination of mobilizing parents and empowering children to resist the pressure to initiate drug use.

School-based programs should not only involve parents, but should, where possible, also collaborate with community organizations and programs. Such a collaboration of law enforcement, including the SBI, local sheriff's department, Department of Social Services, local medical and mental health providers, and local businesses, has already been convened for several counties in the Western North Carolina area. The school-based intervention is a part of a wider comprehensive community preventative effort, which is planned to be long term, to involve different segments of the community in development and implementation, and, over time, to be targeted to various audiences. This involvement of a variety of audiences recognizes that training across the disciplines allows for the sharing of knowledge so that prevention and education, treatment, and law enforcement officials can build a stronger prevention program.

### *Conclusion*

The problems associated with methamphetamine use have caused some researchers in an ongoing research project in seven Central Illinois counties (Haight, Jacobsen & Sheridan 2005) to describe its effect as a tornado in its destructive effect on rural families and their children. There is all reason to assume similar effects on the lives of Western North Carolina's children as the use of methamphetamine becomes more widespread in the area. It is becoming clear to the professionals and caregivers who pick up the pieces that treatment of the trauma, which are the mental health, family and social consequences inflicted by methamphetamine use, will inflict a high short and long-term burden on the community. More research into these consequences is clearly needed but research into effective preventions strategies is likely to be of greater immediate value. More studies are likely to yield better, research-based interventions targeted specifically at teenagers and aimed at preventing initiation of drug use. Some psychologists have suggested however that resilience should be seen, not in and individual context, but within the framework of



developmental experiences grounded in the community context. (Debold, Brown, Weseen & Brookins 1999; Perry 2000) There is a growing body of research from large-scale longitudinal studies that attests to the relatively large influence of family-level factors on children and adolescents' health and wellbeing (Prior, Sanson, Smart & Oberklaid, 2000; Resnick, Bearman & Blum, 1999). Research has also shown that methamphetamine users are generally exposed to elevated levels of risk factors (Bukstein 1995) that include, but are not limited to, the availability of drugs, low neighborhood attachment and community disorganization, family conflict and management problems, favorable parental attitudes toward, and involvement in, substance abuse, early and antisocial behavior, academic failure beginning in late elementary school, friends who engage in substance abuse, and early initiation in substance abuse. Protective factors include, but are not limited to, family and school bonds, healthy beliefs and expectations, and social and academic competence. It is clear that, while school based intervention has a chance of reducing rates of initial use in rural adolescents, it must be part of a more comprehensive effort with attention paid by the wider community to addressing some of the other family and community-based identified risk factors.

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